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Hold to Vol. XV, 10
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CONTENTS OF VOLUME XV

JANUARY

The Paramo of Santa Isabel.....	ARTHUR A. ALLEN	3
Appreciation of Theodore Nicholas Gill.....	FREDERIC A. LUCAS	9
The Making of a Fur-Seal Census.....	GEORGE ARCHIBALD CLARK	13
The Curiosities of Gemmology.....	L. P. GRATACAP	19
To Dramatize Conservation.....	WINTHROP PACKARD	21
The Crow Indian Sun Dance.....	ROBERT H. LOWIE	23
Educational Motion Pictures in Natural History.....	RAYMOND L. DITMARS	27

FEBRUARY

Animals of Central Brazil.....	THEODORE ROOSEVELT	35
The Roosevelt-Rondon Scientific Expedition.....	L. E. MILLER	49
Roosevelt's <i>Through the Brazilian Wilderness</i> —A Review.....	J. A. ALLEN	64
Guarding the Health of Armies.....	C.-E. A. WINSLOW	67
Home Songs of the Tewa Indians.....	HERBERT J. SPINDEN	73
Memories of Professor Albert S. Bickmore.....	L. P. GRATACAP	79

MARCH

Portraits.....	90
American Indian Dances.....	ROBERT H. LOWIE 95
Indian Dances in the Southwest.....	HERBERT J. SPINDEN 103
The Conversation of John Muir.....	MELVILLE B. ANDERSON 117
With Stefánsson in the Arctic.....	BURT M. MCCONNELL 123
The Geographical Results of the Roosevelt-Rondon Expedition.....	W. L. G. JOERG 129
Daniel Giraud Elliot — A Biographical Sketch.....	133

APRIL

Portraits of John Burroughs, Naturalist and Author.....	146
Hunting the African Buffalo.....	CARL E. AKELEY 151
The "Toad Group" in the American Museum.....	MARY CYNTHIA DICKERSON 163
Aquarelles of our Common Woodlands.....	WARREN H. MILLER 167
Bird Baths and Drinking Pools.....	ERNEST HAROLD BAYNES 176
Motion Picture Records of Indians.....	PLINY E. GODDARD 185
August Weismann, Zoölogist: an Appreciation.....	FRANK R. LILLIE 189
Morgan's <i>Heredity and Sex</i> ; A Review.....	E. G. CONKLIN 194
Note on the Crocker Land Expedition Ship.....	GEORGE H. SHERWOOD 195

MAY

Portraits.....	202
Oxygen and Water on Mars.....	PERCIVAL LOWELL 207
The Photograph in Astronomy.....	E. C. SLIPHER 211
Louis Agassiz Fuertes — Painter of Bird Portraits.....	FRANK M. CHAPMAN 221
The Penguins of South Georgia.....	ROBERT CUSHMAN MURPHY 225
European Caves and Early Man.....	N. C. NELSON 237
Fishes of the Deep Sea.....	L. HUSSAKOF 249
Volcanoes of the Lesser Antilles.....	EDMUND OTIS HOVEY 254
Ground-Sloth from a Cave in Patagonia.....	W. D. MATTHEW 256
Somalkoli Dance at Sichumovi.....	F. S. DELLENBAUGH 256

OCTOBER

Series of Recent Museum Groups.....	266
Tyrannosaurus, the Largest Flesh-eating Animal that Ever Lived.....	BARNUM BROWN 271
Birds of the Congo.....	JAMES P. CHAPIN 281
Reproductions in Duotone of African Photographs.....	opposite 292
The Trail of War in Macedonia.....	DAVID STARR JORDAN 293
The Penguins of South Georgia.....	ROBERT CUSHMAN MURPHY 301
Ancient Gold Art in the New World.....	HERBERT J. SPINDEN 307
Frederic Ward Putnam, 1839-1915.....	CLARK WISSLER 315

NOVEMBER

Elephant Hunting on Mount Kenya.....	CARL E. AKELEY 323
Reproductions in Duotone of Antarctic Photographs.....	opposite 338
The Stefánsson Expedition of 1913 to 1915.....	A. W. GREELY 339
In the Home of the Hopi Indian.....	CLARK WISSLER 343
Beginnings of Natural History.....	CHARLES R. EASTMAN 349
Evolution of Arms and Armor.....	BASHFORD DEAN 357
Tsimshian Stories in Carved Wood.....	GEORGE T. EMMONS 363
Exploring a Spur of the Andes.....	LEO E. MILLER 367

DECEMBER

An Explorer's View of the Congo.....	HERBERT LANG	379
Reproductions in Duotone of African Photographs.....	opposite 388
Ancient Cities of New Mexico.....	N. O. NELSON	389
Explorations in the Southwest by the American Museum.....	CLARK WISSLER	395
Animals of Blown Glass.....	HERMAN O. MUELLER	399
The American Museum's Reptile Groups in Relation to High School Biology.....	GEORGE W. HUNTER	405
Hunting Deer in the Adirondacks.....	ROY CHAPMAN ANDREWS	409
News from the Crocker Land Expedition.....	415
Beginnings of American Natural History.....	CHARLES R. EASTMAN	417
A Valuable New Bird Book: A Review.....	T. GILBERT PEARSON	423
Fragments of Spider Lore.....	FRANK E. LUTZ	424
Corythosaurus, the New Duck-billed Dinosaur.....	W. D. MATTHEW and BARNUM BROWN	427

ILLUSTRATIONS

African, Natives, insert opp. 292, covers (Oct.), (Dec.), 381-388, insert opp. 388; Scenes, insert opp. 292	Hygiene, Military, 66-71
Akeley, Mrs. Carl E., 337	Indian, dance costumes, 94; Crow, Sun-Dance, 23, 24; Dances, 95, 101, insert opp. 102; 103-115; cover (Mar.)
Andes, 368, 369, 370, 371	Indians, Apache, 185, 186, 187; Hopi, 341, 345, 346; Nambiquara, 62; Parecis, 56, 57, 59, 61; Pueblo, opp. 78; Taos, 78, insert opp. 78; Tewa, 73, 76, 77
Armies, Diet of, 66, 67, 69, 70, 71	Katydid, 26
Arms and Armor, 356, 359, 360, 362	Lang, Herbert, 203, 378
Bad lands, Cretaceous, 275, 276, 277, 278	Macedonia, 293, 295, 296, 297
Baynes, Ernest Harold, 422	Mawson, Antarctic expedition, insert opp. 338, cover (Dec.)
Bird, baths, 176, 178, 181, 182, 183, 184; Portraits, 220, 223, 224, insert opp. 224, cover (May); Congo birds, 282-291	Mawson, Sir Douglas, 93
Buffalo, African, 152, 159, 160, 161	Muir, John, 116, 121
Burroughs, John, 146, 147, 148, 149, 150	Natural History, Early Illustrations, 348-355; 417-420
Brazil, Animals of, 38-47, 65, back and front covers (Feb.)	New Mexico, Ancient Cities of, 389-398
Brazil, Central, Map, 129	Paraguay River, Along the, 48, 51, 52, 58
Caves, of Early Man, 236-247, back cover (May)	Planets, 211, 212, 213, 214, 216, 217, 218
Chapin, J. P., 204	Peary, R. E., 92
Comet, a 1910, 215	Penguins, 206, 225, 227, 228, 229, 230, 231, 233, 235; 301-305; Penguin group, 430
Congo, birds, 282-291; Forest, 280, 283, 284; Grass country, 285; Natives of, 381-388, insert opp. 388, front cover (Dec.)	Portuguese Man-of-war, 199
Conservation, Dramatizing, 21	Putnam, F. W., 314
Deming, E. W., 91	Red Deer River, Alberta, 279
Deer, Hunting, 409-414; Whitetailed, of Adirondacks, back cover (Dec.)	Rhinoceros, African, 157, 318.
Doubt, River of, 35, 36, 37, 63	Rondon, Colonel, 34, 43
Duck, Labrador, 136	Roosevelt, Theodore, 34, 35, 36, 38, 41, 43, 45, 46, 49, cover (Jan.)
Elephant Hunting on Mount Kenya, 322, 323, 325, 326, 327, 330, 333, 334, 335, 336, 338	Santa Isabel, Paramo of, 2, 4, 5, 6, 7
Elliot, D. G., opp. 133, 134, 135	Stuart, R. L., 137
Fishes, Deep Sea, 248, 252, 253	Taos, Mountains, 72, insert opp. 78
Fuertes, Louis Agassiz, 205	Taylor, W. S., 90
Fur-seals, 12, 13, 15, 16, back and front covers (Jan.)	Telescope, Lowell Observatory, 208, 210
Gemmology, Curiosities of, 18, opp. 20	Toad group, back and front cover (April), 162, 164, 165, 166, insert opp. 166; 168-174, 405
Gill, Theodore Nicholas, 9	Tsimshian, carved wood, 364
Glass, Blown, Animals of, 399-403	Tyrannosaurus 270, 273, 274, 276, back cover (Oct.)
Goldwork, Ancient, 306, 308, 309, 310, 311, 312, 429	Wandorobo, Family of, 156; Guide, 158
Great Auk, back cover (Mar.)	Weismann, August, 188
Groups, Museum, 266-270, 342-347, 405, 408, 430	
Hornaday, W. T., 202	

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VOLUME XV

JANUARY, 1915

NUMBER 1

CONTENTS

Cover, Fur Seals at Pribilof Islands

Photograph taken by Roy C. Andrews, St. Paul Island, 1913

Frontispiece, Paramo Valley, Santa Isabel

Photograph in the Central Andes by Arthur A. Allen

The Paramo of Santa Isabel.....ARTHUR A. ALLEN 3

Vivid word picture of the verdure and silence of the South American forest and the austere splendor of this paramo of the central Andes, 13,000 feet above sea

Appreciation of Theodore Nicholas Gill.....FREDERIC A. LUCAS 9

Theodore Nicholas Gill, for many years in the Smithsonian Institution and Library of Congress and to be counted among noted American zoölogists, died in Washington September 25, 1914

The Making of a Fur-Seal Census.....GEORGE ARCHIBALD CLARK 13

Accurate enumeration the really important practical problem in connection with the fur-seal herd of the Pribilof Islands

The Curiosities of Gemmology.....L. P. GRATACAP 19

Review of a recent book by George Frederic Kunz, honorary curator of gems in the American Museum, on superstitions and meanings attached to precious stones. With color plate of three valuable gems in the Morgan Collection of the American Museum

To Dramatize Conservation.....WINTHROP PACKARD 21

A suggestion as to the value of the drama in educational work

The Crow Indian Sun Dance.....ROBERT H. LOWIE 23

Educational Motion Pictures in Natural History.....RAYMOND L. DITMARS 27

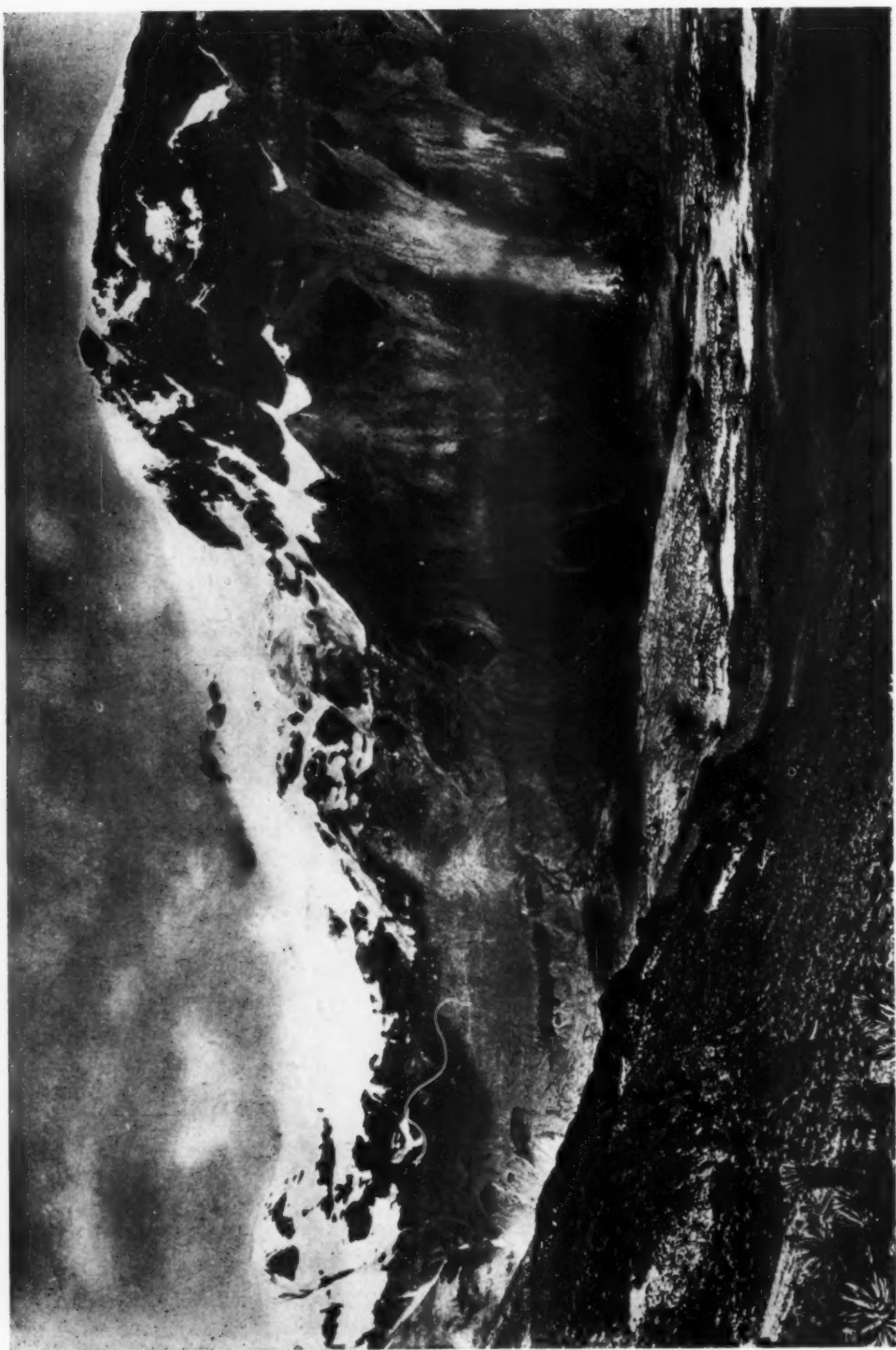
Museum Notes..... 29

MARY CYNTHIA DICKERSON, *Editor*

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PARAMO VALLEY, SANTA ISABEL

THE AMERICAN MUSEUM JOURNAL

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THE PARAMO OF SANTA ISABEL

By Arthur A. Allen

Photographs by the Author and by L. E. Miller

LOOKING through the perspective of a few years upon my experience in the Andes of Colombia, the days spent on the paramos recur most vividly to my mind. The debilitating weeks in the steaming coastal forests with their parasites and fevers, the long hours in the dugout canoes beneath the blazing vertical sun, the dust of the valley trails, and the lomas with their clouds of locusts pass from me. I forget the interminable silence of the Cloud Forest, its soaking moss and epiphytes, but as often as memory recurs, comes to me the austere splendor of those stretches of rock and sky, of ridge piled upon ridge, backed by a line of snow and gray cloud and bathed in an atmosphere cool and clean. It was a land of peculiar fascination to me. I recall how we toiled across the paramo of the Valle de Pappas and though at this time so lashed by wind and rain that the trail was visible hardly fifty paces ahead, it still had lost none of its charm. Peaceful as it is during its few months of summer, the Andean paramo is a land of sleet and storm during the rest of the year; indeed

many of the trails even at the equator are closed, and man and beast that attempt to cross are frozen to death.

The paramo of Santa Isabel lies about two days' journey from Salento, the largest town on the Quindio trail which crosses the central Andes, and on clear days, especially toward dusk, can be seen at several points rising above the forest-capped ridges to an altitude between sixteen and seventeen thousand feet. Beyond it and a little to the east lies the paramo of Ruis, and most magnificent of all, Nevada del Tolima, with its crown of crystal snow gleaming in the rays of the setting sun. Many travelers pass over the trail without ever a glimpse of the snows to the north, seeing only the banks of clouds that obscure even the tops of the moss-forest and hide all but the near distance. The sight of the snows is so unusual even to the natives that with the first lifting of the clouds groups of travelers assemble at the open spots along the trail and discuss the coming of winter.

So it was in the little town of Salento where we happened to be stopping. They manifested great concern over our proposed trip and told us that we must hasten if we would camp on the paramo before the storms set in, when life there would be impossible. So one morning in early September we slung our packs and started for the paramo of Santa Isabel. From Salento the trail to the paramo leads first down into the Boquia

Note.—Dr. Arthur A. Allen, a member of the biological staff of Cornell University, was connected with the Museum's expedition in Colombia, from August, 1911 to May, 1912. During this period, in cooperation with Mr. Leo E. Miller, he made important collections in the vicinity of the Quindio Trail, and in the little-known region between Popayán and the Valle de Pappas, and San Agustín; also in the Cauca and Atrato valleys. In the latter region he contracted a severe type of malarial fever which necessitated his return to the United States.



Santa Isabel from the Quindio Trail—Cloud Forest in the foreground has more tropical luxuriance than the lowland jungles, the trees being burdened with giant vines and they in turn laden with moss and fern and orchid. Cloud Forest extends up the mountain side from 9000 feet to timber line at about 12,500 feet

Valley and then follows the river's meandering course through groves of splendid palms nearly to its source, when it turns abruptly and begins a steep ascent of the mountain side. The palm trees, in scattered groves, continue to nearly nine thousand feet, where the trail begins to zigzag through some half-cleared country, where the trees have been felled and burned over, and where in between the charred stumps, a few handfuls of wheat have been planted and now wave a golden brown against the black.

And next the Cloud Forest! It is seldom that the traveler's anticipation of any much heralded natural wonder is realized when he is brought face to face with it. Usually he feels a tinge of disappointment and follows it by a close scrutiny of the object before him in search of the grandeur depicted, but not so with the Cloud Forest. It surpasses one's dreams of tropical luxuriance. It is here rather than in the lowland jungles that nature outdoes herself and crowds every available inch with moss and fern and orchid. Here every twig is a garden

and the moss-laden branches so gigantic that they throw more shade than the leaves of the trees themselves. Giant vines hang to the ground from the horizontal branches of the larger trees and in turn are so heavily laden with moss and epiphytes that they form an almost solid wall and present the appearance of a hollow tree trunk fifteen or twenty feet in diameter. One should pass through this forest during the rainy season to form a true conception of its richness, although even during the driest months the variety and abundance of plant life covering every trunk and branch seem beyond belief.

Quite as impressive as is its luxuriance, is its great silence. One walks for hours along its rank trails, sometimes sinking knee-deep in the wet forest mold, and hears no sound. A slight *tsip* or a buzz of wings in the tree top may tell of the presence of a honey creeper or humming bird, or the weird call of a tinamou or an ant thrush from the dark recesses may startle one, only to leave him the more impressed by the great breathless silence.

The trail through this forest was new and while perhaps not quite as steep as the old Indian trail, was very difficult in places. Many times we dismounted and led our horses, where the soft mold of the trail seemed insecure and where even a slight floundering of the animals might have pitched us down the mountain side. Even with such care one of the mules floundered and before we

change occurs. The trees become dwarfed, their leaves small and thick, heavily chitinized or covered with thick down, and remind one of the vegetation about our northern bogs with their Andromeda and Labrador tea. Here too the ground in places is covered with a dense mat of sphagnum, dotted with dwarfed blueberries and cranberries and similar plants which remind one of home.



Looking back at timber line—We had left the tropics of Cloud Forest and come into a temperate region, almost on the equator but more than 12,500 feet above the sea. The photograph shows clouds rolling in at the left

could get to his assistance was rolling over and over down the mountain. Fortunately it was still in the forest and one of his packs became wedged in the roots of a tree, holding him until we could get to his release.

This great forest occasionally interrupted by clearings, continues for many hours' travel up the mountain from 9000 to about 12,500 feet, where a sudden

A cool breeze greets the traveler, sky appears in place of the great dome of green, and suddenly he steps out upon the open paramo. He has been traveling through the densest of forests, seeing but a few hundred paces along the trail and only a few rods into the vegetation on either side; he has grown near-sighted, and even the smallest contours of the landscape have been concealed by the

dense forest cover. Suddenly there is thrown before his vision a whole world of mountains. As far as he can see in all directions save behind him, ridge piles upon ridge in never-ending series until they fuse in one mighty crest which pierces the clouds with its snow-capped

crown. This is the paramo of Santa Isabel.

At this point we dismounted and led our horses along the narrow ridge, for they were not used to the mountains. We looked in vain for the jagged peaks that are so characteristic of our northern



On the paramo of Santa Isabel—The ground is undermined with numerous small rivulets and the strange mullein-like *frailejones* grow everywhere even up to the edge of the snow, sometimes reaching a height of ten feet in sheltered places

frost-made mountains. Here even the vertical cliffs did not seem entirely without vegetation and as far as we could see with binoculars the brown sedges and the gray *frailejons* covered the rocks even up to the very edge of the snow. Beneath our feet the soil was springy and as we afterwards found, undermined with innumerable small rivulets making their way to the stream below, which we could hear even at this distance as it dashed over the boulders and occasionally gleamed in the sunlight. All about us the strange mullein-like *frailejons*, as the natives call them, (*Espeletia grandiflora* Humb. and Bonpl.), stood up on their pedestals, ten or even fifteen feet in height in sheltered spots; down among the sedges were many lesser plants similar to our North American species: gentians, composites, a hoary lupine, a buttercup, a yellow sorrel, almost identical with those of the United States.

Birds also, several of which proved to be new to science, were numerous, but all were of dull colors and reminded one in their habits of the open country birds of northern United States. A goldfinch hovered about the

frailejons, a gray flycatcher ran along the ground or mounted into the air much like our northern horned larks, an ovenbird flew up ahead of us resembling a meadowlark, a marsh wren scolded from the rank sedges, and almost from under our horses' hoofs, one of the large Andean snipes sprang into the air with a characteristic bleat and went zigzagging away. On a small lake which we now had come to, barren except for a few algae, rode



In the shadow of a frailejon — The nest is made entirely from the down of the frailejon leaves and belongs to a slate-colored finch (*Phrygilus unicolor*). On the paramo the leaves of all plants are either small and horny or heavily covered with down

an Andean teal, surprisingly like our northern gadwall. And so the story goes on. Here almost on the equator but 13,000 feet above the level of the sea, we had left the strangeness of the tropics and come upon a land that was strikingly like our own.

We decided to pitch camp at timber line where there would be wood for cooking and so made our way back down the valley to the edge of the trees where we had some difficulty in finding a dry level spot for the tent.

Here we studied and collected for about a week, working up the ridges to 15,000 feet but finding greater abundance of bird life along the dashing stream that flowed down the valley in which we were camped. There was not however, a great variety of birds and but few species were really common. Mammals too, were scarce, a few tracks of deer and tapir along the edge of the forest and numerous runways of the rabbits in the rank sedges, being almost the only visible signs. Even the smaller rats and mice were scarce, and few came to our traps.

Each night the temperature dropped to freezing, each noon the temperature rose to about 75 degrees Fahrenheit, and each afternoon great white clouds rolled up from the forests below and obscured the landscape. One dared not venture far from camp after three o'clock, for the great mass of anastomosing ridges would easily confuse even the traveler with a compass. In fact one day when returning from an exploring trip to the snow line, the clouds rolled up while we were still four or five miles from camp. Ridge after ridge disappeared from sight until

soon we could see only the rocks close about us. There was no trail to follow and we were soon unable to recognize any of the features of the landscape that were still visible. For two hours we stumbled along trying to keep track of the number of ridges as we passed them and trying to recall the number passed during the morning, until finally we gave up hope of return that night. Looking about for a spot somewhat sheltered from the raw winds which had already begun to sweep down from the snows above us, a ray of light very far to the left attracted our attention and we looked just in time to see the rift in the clouds close again. We knew it must have been reflected from the small lake at the head of the valley in which we were camped and realized that we had been traveling at least an hour in exactly the wrong direction. It was not reluctantly therefore, that we abandoned the thought of beds of *frailejons* and made straight for our little lake. In terrible thirst and fatigue and after many collapses from the great altitude, we were able at last to perceive its dim silver outline, and we knew we were little more than a mile from camp.

This was our first warning to leave the paramo. In a few weeks these ridges would be covered with snow and swept by gales. The clouds and fog would not part for days and life would be unendurable — although even then one would feel the more deeply the grandeur of the elements, and with the mountain tops shut from view, would still know their awe-inspiring presence. With this warning then, we prepared to leave the paramo.

AN APPRECIATION OF THEODORE NICHOLAS GILL

By Frederic A. Lucas

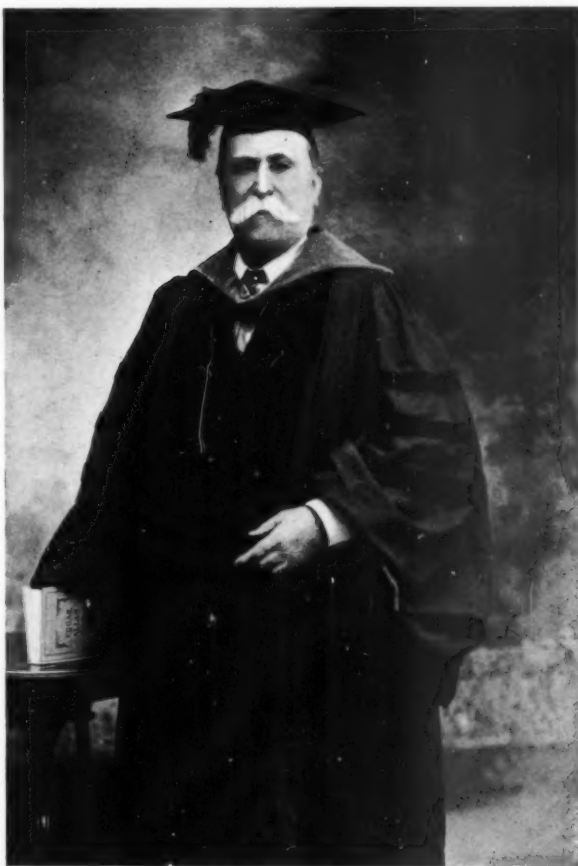
THERE died in Washington on September 25, 1914, the man who may well be termed the Nestor of American zoölogists, not perhaps so much from the fact that he chanced to be a year or so older than his compeers, as from his extraordinary grasp of various branches of zoölogical science. Theodore Nicholas Gill was born in New York, March 21, 1837. He passed part of his early life in Brooklyn, and we infer from his "Reminiscences of the Apprentice's Library" that this ancestor of the Brooklyn Institute of Arts and Sciences had much to do with turning his attention from law toward natural history.

He first became familiar with the Institute that was to be, in 1854, when he was seventeen, and as long as he remained in Brooklyn, made use of its library and collections and was a regular attendant at the meetings of the Lyceum of Natural History, being for a part of the time its secretary.

The fact that shells were the objects most readily obtained and preserved by amateurs, and the accessibility of the fine ichthyological library of Mr. J. Carson Breevoort, seem to have been the factors that directed his attention to conchology and ichthyology, although, as noted farther on, other factors came into play later. The influence of Baird and of the Smithsonian Institution led him to Washington in 1863, where for a time he was librarian of the Smithsonian Institution and later, assistant librarian of the Library of Congress.

For one who achieved such important results he did comparatively little orig-

work, from a natural indolence of body which led him to take life easily, to shun the dissecting table, to relegate the labor of preparation to others and to utilize their work, even if he might not accept their conclusions, for he possessed to an unusual extent the ability to make use of the work of others, not by claiming it



as his own, but by embodying it as one of many items in some important generalization. If one may so put it, he took the bricks of information turned out by many workers and combined them into an edifice of knowledge. As might perhaps be expected from one of his temperament, he was a "closet" rather than a "field" naturalist, although in his earlier days he visited the West Indies in the interests of Mr. D. Jackson Steward, whose shells¹ form part of the collections of the American Museum of Natural History.

For many years his favorite morning haunt was the library of the United States National Museum, and later, the periodical room in the Smithsonian, where he read the standard scientific journals as soon as they were received, and noted the most recent discoveries in those lines in which he was especially interested. This extensive reading, coupled with a wonderfully retentive memory, made him an extraordinary source of information. He was a veritable storehouse of zoological facts, which were freely placed at the disposal of anyone who really wished them. As a matter of detail, he probably had at his tongue's end more scientific names of animals than any other living man — more probably than anyone will ever know again. This wide knowledge rendered easy such work as the technical parts of the zoological portion of the *Century* and *Standard* dictionaries. In the first-named work he was associated with Dr. Coues, and more than once sorely tried the patience of his colleague by his procrastinating habits,² for while Coues was a fluent talker and ready writer, he was also a hard and syste-

matic worker, as his many books and various papers bear witness. It is rather interesting to note that these two men, Coues and Gill, should have been so closely associated, for Coues probably did more than any other one man to popularize the study of birds and mammals, and Gill, though largely indirectly, did much to systematize and stabilize the technical side. As an example of Gill's ultra-technical style may be cited his definition of Giraffidæ:

A family of ruminant artiodactyl mammals, having the placenta polycotyledonary, the stomach quadripartite with developed psalterium, the cervical vertebræ much elongated, the dorso-lumbar declivous backwards and horns present only as frontal apophyses covered with integument.

Coues read this and turning to Gill said, "That is n't English, its Choctaw." "No," said Gill, "it is an exact definition of the family."

For many years, more than twenty to the writer's knowledge, Gill occupied a room on the west side of the big north tower of the Smithsonian, and for a long time Coues had an office on the opposite side, the two opening into a still larger intercommunicating room. Dr. Gill's room like the girl's workbasket, had a "place for everything and everything in it," — desk, chairs, shelves, floor — especially floor — were covered, aside from dust, with a miscellaneous collection of books, pamphlets, old letters, skulls, skeletons and odds and ends of wearing apparel. During the summer this deposit, like a lava stream, flowed

¹ Gill's second published paper was on *Cypræa notata*, now considered a synonym of *C. macula*, from a specimen in the collection of D. W. Ferguson, which is now in the collection of Columbia University.

² The recent article in *Science* is in error in calling Dr. Gill the author of the zoological text of the *Century Dictionary*: Dr. Coues was the editor and wrote the major part of the definitions and chose the larger number of the illustrations; Dr. Gill was the scientific adviser, so to speak, and Coues relied largely upon him for accurate and technical information. Gill wrote a large share of the technical definitions, particularly those of the families and genera of mammals and fishes. — The Author.

slowly eastward until by fall all three rooms were filled and Dr. Gill was working at Coues's desk. Here and in the Museum library Dr. Gill's papers were mainly prepared, for even in his later days he rarely made use of a stenographer. Gill's astonishing knowledge of names and his exactness in matters of nomenclature made him extremely helpful in the bestowal of names upon new species, and it was customary for one about to christen some newly discovered beast, bird or fish to ask him if the proposed name had been previously used, a procedure that saved much time and many synonyms. He excelled in tracing the history of some much described species through the mazes of literature in which it had wandered, and delighted to show that what Aristotle is supposed to have called some animal was really quite a different creature.

He was the first president of the Biological Society of Washington and hence a life member of the council; he was also an almost constant attendant at its meetings. As the present specialization of societies had not even begun, the members of this society represented many branches of science and the papers presented covered a remarkably wide range of subjects, varying from technical to popular, and from Protozoa to Primates.

It mattered not what paper was presented, it came to be expected that if Dr. Gill did not lead the discussion, he would participate in it, and when at the close of some paper the hearers turned expectantly toward Dr. Gill, they were rarely disappointed. He was a severe, one might almost say merciless critic, not from any particular personal animus, but because he expected an exact statement of fact.

While the majority of Gill's papers were systematic, yet on occasion he

could write most entertainingly, and not only did he have a vast fund of information on which to draw, but the reader had the satisfaction of feeling that he could rely upon what he was being told. His contributions to zoögeography were numerous also and the subject was dealt with in at least two of his presidential addresses.

Among the more important deductions that he made were the recognition of the claim of the Elasmobranchs to a position of the "highest" rank and of the purely artificial nature of the groups Carinatae and Ratitæ in birds. He accurately defined and established on a sound structural basis seven orders of fishes, to say nothing of genera, and was practically the first to suggest that the curious little fishes termed *Leptocephalus* were larval forms of eels.

As an example of the estimation in which the work of Dr. Gill was held by fellow scientists, one cannot do better than to quote an extract from David Starr Jordan's *Guide to the Study of Fishes* read by Dr. Smith at the Testimonial Dinner to Dr. Gill:

Theodore Nicholas Gill is the keenest interpreter of taxonomic facts yet known in the history of ichthyology. He is the author of a vast number of papers, the first bearing date of 1858, touching almost every group and almost every phase of relation among fishes. His numerous suggestions as to classification have been usually accepted in time by other authors, and no one has had a clearer perception than he of the necessity of orderly methods in nomenclature.

And Dr. Jordan further wrote:

In my scientific work I have owed more to the critical ability of Dr. Gill and his clear insight in matters of classification and generic relations than to any other man whatsoever. In all the long history of science there has been no one who has had this unique quality of being able to see through unimportant things to the real heart in biological classification as has Dr. Gill.

FUR-SEAL ROOKERY

In the photograph below is shown a massed rookery area from which 10,575 pups were counted. Hutchinson Hill, St. Paul Island



ROOKERY READY FOR COUNTING

The photograph above shows a beach rookery cleared of adult seals and ready for pup counting

THE MAKING OF A FUR-SEAL CENSUS

By George Archibald Clark

[Of Leland Stanford University]

THE really important practical problem in connection with the fur-seal herd of the Pribilof Islands has always been that of enumeration. How many animals are there? Is the herd increasing or diminishing? What is the rate either way? What number of young males can safely be taken each year? What breeding reserve should be set aside? These questions can be answered effectively only by a more or less exact census of the herd.

In making a fur-seal census you cannot, as in the case of human communities, go to the head of the household. The harem master is not an approachable being and will not discuss family affairs with you. You go within his circle, if at all, at your peril. You can stand on the neighboring cliffs and looking down upon his household observe many things of interest; but this will not tell you whether all his wives are at home or how many children he has. The children hide in

the crevices of the rocks and most of the mothers are away at sea feeding.

It is easy to count the harem masters. Each one is big and aggressive and is always at home. As you come into his range of vision he rises up to greet you like a bristling question mark. The fur-seal families can therefore be easily

counted. It is even possible to count the individual females on many scattered breeding areas, and this fact has been utilized at times to gain an approximate enumeration, an average harem being thus obtained which could be applied to breeding areas where counts of individuals were impossible.

The fur-seal census however, does not rest finally with the adult animals; it rests in the young of the season, or the fur-seal pups. Although destined to spend most of its life in the water and to brave all kinds of weather, the fur-seal pup in the beginning is timid of the water and keeps away from it during the first month or six weeks of its life.



Bull fur seal, Gorbach Rookery, St. Paul Island

There is a time therefore in each breeding season when all of the pups are absolutely within reach; and as there is a mother for each pup, a count of the pups is in effect an enumeration of the mothers — the breeding females — the all-important element in the herd.

By the first of August each season, practically all of the fur-seal pups are born. About this time also the majority of the harem masters, who have fasted since their arrival in May, have withdrawn from the rookeries to feed at sea. The mother seal, while she will defend her pup of a few hours old with her life, pays no attention to it when it is a week or more old, betaking herself promptly to the sea when disturbed and leaving the pup to shift for itself. A very little urging therefore suffices to clear the rookeries of the older animals, leaving the young to be dealt with by themselves. The period is a limited one because when the fur-seal pups begin to take to the water the transition from a land animal to a water animal is very sudden and after the pups gain command of themselves in the water they take to it instantly when disturbed. There is however, a period of about ten days in early August when the pups can be controlled and counted.

The fur-seal rookeries occupy about eight miles of shore front, generally in a narrow band twenty to fifty feet in width. At certain points there are massed areas. Each form of breeding ground has its own problems in the counting. The narrow beaches have holes and crevices among the rocks where the little animals hide. On the massed areas they can be more readily controlled, but there is danger of crowding and smothering. The difficulties in neither case are serious and call merely for care and experience in dealing with them.

On the narrow beach portions, the

process of counting is carried out by two persons, one passing along the seaward side of the rookery, the other on the landward side. Coming together they cut off a small group of twenty-five to one hundred pups and force them to run back along the beach twenty to fifty yards. These pups represent varying ages and degrees of strength since they are born at different dates between the twelfth of June and the first of August and they therefore naturally line out in order of capacity to travel and this line can be readily counted. The process is like that of the counting of sheep as they pass through a narrow gate. Group by group the pups of a given rookery are counted. Between the passage of the separate pods, or groups, the openings in the rocks are searched for hidden animals. Careful search is also made for the dead, a necessary part of the enumeration. The services of native helpers who, preliminary to the work of counting have driven off the adult animals, are utilized at all times to keep the pods of counted animals from mingling with those not counted.

Where massed groups occur they are rounded up and held loosely on some flat surface, a native guard being posted about, except at one point from which the animals are allowed to run off. These departing pups again travel readily in lines which can be counted by two's and three's and four's. If tendency to stampede develops, a guard is thrown across the front and a new opening at some other point is established. By the above process, repeated and varied as conditions demanded, in a period of four hours, approximately eleven thousand fur-seal pups were handled and counted from the massed breeding ground under Hutchinson Hill on St. Paul Island in July, 1913. One of the accompanying photographs illus-



A general rookery view from the cliffs, showing contrast between males and females by which harems can be counted.

The young seals hide in the crevices of rocks and a large number of the mothers may be away at sea feeding, but it is easy to count the harem masters who are big and aggressive and are always at home. An approximate average of the females in a harem must often be applied to packed breeding areas where the bulls alone are conspicuous and individual enumeration impossible



The process of counting fur-seal pups in the massed area on Hutchinson Hill, July, 1913. Note in the background of the photograph the long line of pups which are being counted as they file past.

Fur-seal pups are easily counted only during a period of some ten days in early August. This is after they are a week or so old and the mothers no longer defend their young but depart leaving them to shift for themselves, and before they have learned to take care of themselves — in which later condition of course they take to the water as soon as approached

GUARDING HIS HAREM
Fur seals of the Zapadin Rookery,
July, 1913



A MASSED POD OF PUPS BEING HANDLED IN COUNTING

trates the operation of counting and the following is a record of the pods as run off:

152, 108, 146, 54, 128, 152, 116, 40, 152, 68, 200, 78, 96, 150, 234, 192, 44, 52, 56, 122, 144, 23, 83, 110, 66, 150, 232, 98, 10, 102, 120, 53, 119, 106, 118, 14, 56, 62, 58, 88, 91, 68, 21, 61, 42, 110, 67, 72, 68, 88, 90, 66, 48, 20, 61, 58, 88, 50, 80, 168, 14, 68, 37, 68, 116, 82, 68, 33, 128, 41, 44, 15, 25, 54, 134, 243, 54, 90, 42, 116, 75, 120, 100, 57, 36, 17, 116, 44, 36, 50, 79, 88, 68, 115, 69, 118, 153, 122, 56, 33, 55, 48, 70, 124, 174, 63, 180, 146, 14, 73, 146, 84, 173, 235, 129, 52, 25, 26, 63, 102. Total, 10,576.

It was by this process of counting, applied day by day to the rookeries in 1912, that the first full count of fur-seal pups was made, the number being 81,984. A repetition of the process in 1913 gave a total of 92,269. The difference, approximately twelve and one-half per cent, marks the rate of increase in the herd between the two seasons, the first seasons for thirty-five years in which the fur-seal herd was free from the drain of pelagic sealing [suspended by treaty of July 7, 1911], with its destruction of mother seals and their young.

These three elements — the adult males, the adult females, and the young of the season — constitute the important features of the fur-seal census. They were thus fixed by actual count.

There remain certain other animals in the herd which cannot be counted. These are the two and one-year-old females and the young males of four years and under. They come and go irregularly, some of them spending very little time on land. The annual rate of increase in the herd, established by the counts of 1912 and 1913, enables us to estimate very closely the number of young three-year-old females on which it depends. The sexes are subject to like vicissitudes and from the approximately equal birthrate of the sexes a

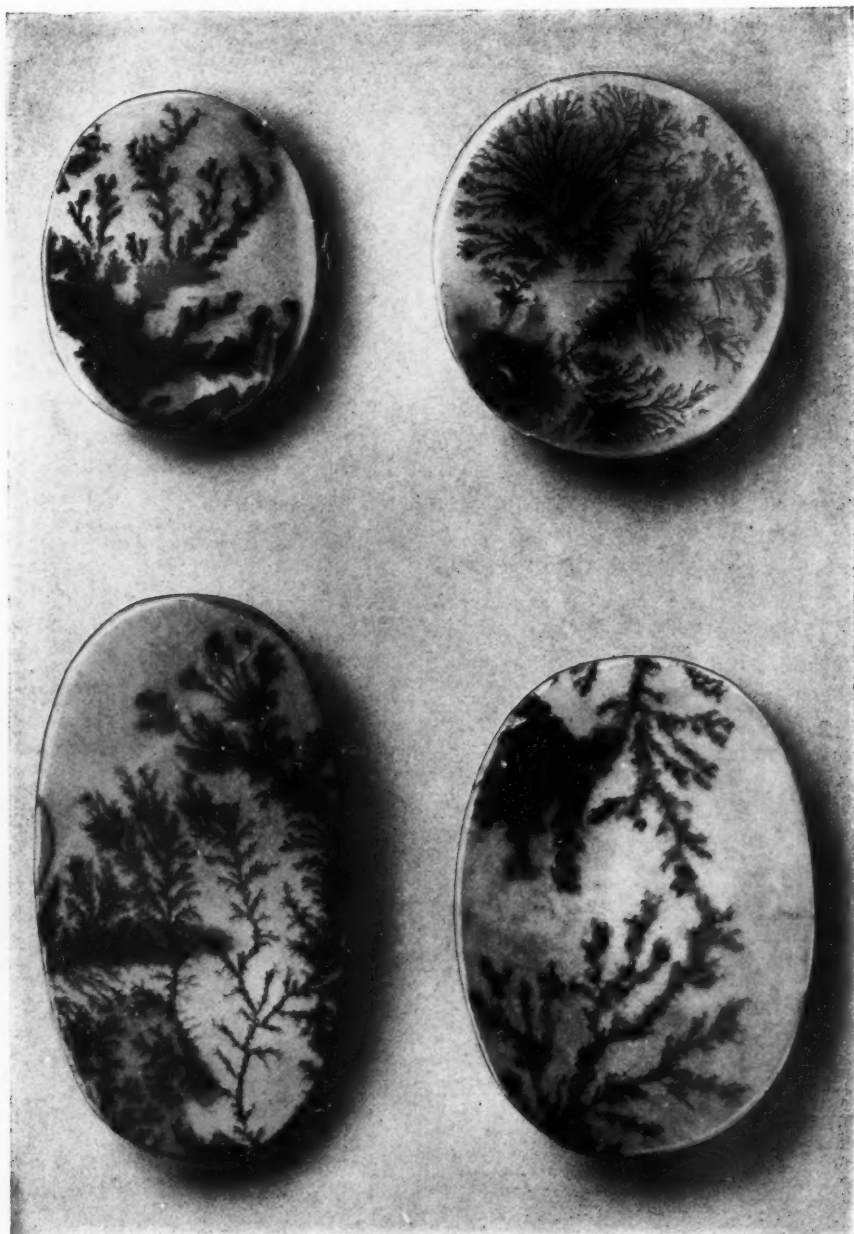
like number of three-year-old males may be assumed to survive. The two-year animals can be closely judged from these, and the yearlings, from births of the preceding year, diminished by the losses which experience shows the animals to suffer in the first migration.

Putting these various estimates together and uniting them with the counted animals we have the following total for the fur-seal herd in the season of 1913:

Breeding males	1,403
Reserve males	2,364
Breeding females	92,269
Young of the season	92,269
Three-year-old males	10,000
Two-year-olds	30,000
Yearlings	40,000
Total	268,305

This census affords to the government as accurate a knowledge of the status of its fur-seal herd as, for example, the average cattleman has of the animals on his range.

The herd will now grow steadily in the future and in due time as many animals may be expected in the herd as it formerly showed, between two and three millions. With this growth, counting of all the pups cannot long be continued. The task will become too great. It can however, be continued on certain limited areas and the balance of the herd judged by these. Certain valuable averages have been obtained — for the individual rookeries, for each of the islands, and for the herd as a whole. It will always be possible to get a reasonably accurate count of the breeding families. To this the known averages of harem sizes in 1912 and 1913 can be applied with a result sufficiently exact for all practical purposes.



MOSS AGATE MOCHA STONES. HINDOOSTAN

Specimens from the Morgan Collection of Precious Stones in the American Museum.
Illustration from *The Curious Lore of Precious Stones*, by George Frederick Kunz, Ph.D., D.Sc.
Copyrighted 1913, by J. B. Lippincott Company, Publishers, Philadelphia

THE CURIOSITIES OF GEMMOLOGY

A REVIEW OF A RECENT BOOK BY GEORGE FREDERIC KUNZ ON SUPERSTITIONS AND MEANINGS ATTACHED TO PRECIOUS STONES

L. P. Gratacap

These metaphysics of magicians,
And necromantic books are heavenly.
Lines, circles, scenes, letters, and characters:
O what a world of profit and delight
Of power, honour, and omnipotence,
Is promised to the studious artisan.

Tragical History of Doctor Faustus.

THE pages of a recent book¹ by Dr. George Frederick Kunz, honorary curator of gems at the American Museum, will be turned over by the fascinated reader with, we imagine, the most interesting commixture of feelings, an interfusion of wonder, amusement and half-credulous assent, of admiration and curiosity. He will feel admiration at the art and discernment, the resources and adequacy of the author, and curiosity as to the origin or real derivation of such strange pre-dispositions, hallucinations and ultra-romantic traditions and fancies, regarding these "mute insensate things."

Certainly the traditions and fancies are not unfamiliar. In any desultory reading they have been encountered by everyone — not forgetting indeed the Wilkie Collins story of boyhood, *The Moon Stone*, but here through almost four hundred pages of anecdote, quotation, description and allusion, reinforced by beautiful figures and plates, the effect is bewildering. Why these attributes of miraculous power? Why the association of precious stones with religious beliefs, why the mystic influences credited to birthstones, the extra-terrestrial stations assigned to gems in the zodiac, and their

ascription to the planets — with the more contemporaneous touch of occultism when we read of the prophetic powers of crystal balls, their magical landscapes and portents? Such questions are surely not answered in Dr. Kunz's work, and indeed a *souçon* of dissatisfaction arises when we think that we discover in the learned writer, a poetic acquiescence in these ascriptions, as perhaps becomes the antiquarian, the virtuoso, the connoisseur, and above all the philosophic historian.

But if reasons are not fully discussed, albeit many passages assume some seriousness in that respect, the display of facts, the careful analysis of reports, and the evidence of large research, the clearness and charm of narration, with the remarkable elegance of illustration, are all there.

The frontispiece of the book is a superbly colored plate of cut and polished gem-stones, many from the Morgan-Tiffany collection in the Museum. This is followed by three other fine examples of color reproduction: Cardinal Farley's ring, gems from the Morgan-Tiffany collection, and the dazzling cross, attached as pendant to the crown of the Gothic King Reccesvinthus. The remaining illustrations evince the qualities of the unusual, the rococo, the quaint, the delicate and the antique, as befits a book of a semiliterary and scientific scope; the touch of the virtuoso is plain and the guidance of expert taste as well. The chapters as they succeed each other are as follows: Superstitions

¹ THE CURIOUS LORE OF PRECIOUS STONES. By George Frederick Kunz. Philadelphia and London: J. B. Lippincott Company, 1913.

and their Sources; Talismans and Amulets; Talismanic Use of Special Stones; Engraved and Carved Gems; Ominous and Luminous Stones [with an exceptionally valuable plate giving the autophotographs of luminous diamonds]; Crystal Balls and Crystal Gazing; Religious Uses of Precious Stones; The High-Priest's Breastplate; Birth-Stones; Planetary and Astral Influences; On Therapeutic Uses of Stones.

The book has an overwhelming wealth of detail and assembled references, available literature and the most diverse elements of evidence having been carefully sifted. We are not sure, but we believe that one field has not been harvested, and that is the Church Fathers, interesting and possibly prolific of quotation, since the patristic writers were inquisitive in many ways. Apart from the purely archaic strangeness of the fancies the book records — regarding the qualities of gems and precious stones, interest emphatically attaches to the accounts of crystal-gazing. It might be regretted that Dr. Kunz has not reviewed at greater length the work of Miss Goodrich-Freer and of Miss Gregor (Andrew Lang's friend), and extracted more liber-

ally from *Crystal-Gazing* by Northcote W. Thomas, as also from Andrew Lang's *Making of Religion*, which has many cases, appreciatively recorded, of "screaming" (short for descreying).

To those of us a little "dematerialized," as Oliver Lodge for instance, an agreeable mysteriousness is felt in Mr. Lang's words, "If then the crystal gazer is right in a considerable percentage of cases, to my unmathematical mind it does look as if some unknown human faculty and fact in nature may be surmised." Dr. Kunz does mention "hypnagogic illusions," the illusive appearances introducing sleep, and he does contribute more space than perhaps he deemed the subject could claim in his work, to a few guesses as to the nature of the queer phenomena so frequently adduced in this connection.

The Curious Lore of Precious Stones is a most entertaining book, and to the reflective reader will afford a singular retinue of impressions as to the vast credulity and the imaginative exuberance of the human mind, so that perchance as he lays it down, he will exclaim with the "Duke" in *Twelfth-Night*:

so full of shapes is fancy
That it alone is high fantastical.



Rubellite, from the
Shan Mountains,
China. Used as idol's
eye in India

Star of India—Proba-
bly the largest star
sapphire in the world

Engraved Emerald—
East Indian Carving,
17th Century

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**GEMS FROM THE MORGAN COLLECTION
IN THE AMERICAN MUSEUM OF NATURAL HISTORY**

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TO DRAMATIZE CONSERVATION

STAGE AND MUSEUM TO JOIN HANDS IN A NEW OPPORTUNITY

By Winthrop Packard

The JOURNAL publishes the present sketch by Mr. Packard concerning museum work as viewed by poet and dramatist, for its suggestiveness. In respect to it relative to the American Museum, we would say that this institution holds the belief that an educational institution of the organization of a museum should employ all the coöperation possible and use all the methods feasible at any given period in the history of civilization, in order to make its service reach the minds and imaginations of the people who come to learn from it. The American Museum in New York is at present broadening its relations with the public schools of the city and employs moving pictures in much of its educational work. That it should at some time in the future use some form of the drama as one of its methods of education, does not seem an impossible step.—EDITOR.

THE poet's vision has done much for the world, and the dramatist visualizing the poet's thought, has done much. Often the two have worked

together for the world's welfare and now the poet comes forward with a new vision. The stage is to visualize conservation and make its needs felt by the public.

"Drama and conservation," says Percy Mackaye to whom we owe the new idea, "is a new coupling of the words, but the present age is restive of tradition and for the first time in history the naturalist and the artist of the theatre have come together to consider how they can serve the public. The nature student never goes to the drama except



For the child the museum must put more beauty and dramatic truth into its exhibits of animals.

Arvia, the poet's little daughter who, wandering in the woods and listening to the hermit thrush, sees and hears as in a dream the story of the play, *Sanctuary*. Through her vision we see the dancing of the dryad in the realm of fantasy, hear the pleading voice of the bird spirit — and come to feel the cruelty that it is to take the life of a wild bird for its plumage



as a diversion. There he expects to forget his study of bird and beast and revel in a world of fantasy which has nothing in common with science. In the same way the worker of the theatre goes to nature merely for rest and relaxation. What does wild nature mean to him excepting a pageant of unnamable birds and animals in whose presence he may forget the cares of his work? But that is the old-fashioned point of view for both. A new school arises and we are discovering that scientists and artists are one soul, seeking truth by two methods — the one objective, the other subjective. Science has fought its fight with superstition and tradition and has won. Art is only beginning its fight with superstition. Dramatic art is not yet delivered from its life scramble with quacks and commercialism. Yet in the hearts of the people, is the origin both of drama and of conservation and there the two will ultimately work together."

"The plea for conservation," says the naturalist Ernest Harold Baynes, "must reach the hearts of the people before it can achieve success. They must visualize the beauty and romance of wild life as well as its economic value. Then they will be willing to conserve it."

Out of these beliefs of naturalist and poet came the bird masque *Sanctuary*, by Percy Mackaye, under the tutelage, one suspects, of Mr. Baynes. The play is a dream of Mackaye's little daughter, to whom through the voice of the hermit comes the great need of preserving our wild birds. "The text-books," says Augustus Thomas, "tell us that drama is a story told in action, but I believe that a better definition is an idea visualized." In *Sanctuary* we have the idea that bird life must be conserved, visualized and made very real.

It is believed that the play gave impetus to the fight for the clause in the new tariff bill, forbidding the importa-

tion of feathers. Thus already has the drama been a powerful agency in forwarding the movement for the preservation of wild birds — but the opportunity has merely a beginning in this. It is easy to see that the needs of forestry, of the protection of our water supply, and in fact of all branches of conservation may be put upon the stage with equal beauty and grace.

"Let us dramatize our museums," says Mackaye. "The natural history museum is established for a great social object, the conservation of wild nature knowledge in the hearts of people. Equipped by science only, it cannot fully obtain the interest of the people for whom it was founded. It must go farther and reach their imaginations. As it stands now indeed, it is a public boon; the people spend their spare time on Sunday at the museum, gazing eagerly at the exhibits although they only in part understand them and do not, in any case, fully appreciate their meaning. They spend their spare time for the rest of the week at the "movies." To them the museum is never ecstatic and vivid, but the moving pictures are. . . . Yet, it ought to be possible so to interpret the exhibits at a museum as to make them live for the general public as do the moving pictures. The naturalists and taxidermists have felt this need in creating the exhibits and have done their best to meet it. It is possible completely to fulfill this need. The drama can do it. . . . Pageantry possesses the people. It must become a civic drama in name and in technique and will develop the masque to fit the public needs."

The masque *Sanctuary* has thus marked the beginning of an epoch in the service which the stage of the future is to render humanity. It offers a new field to player and playwright — a new pleasure and a new incentive to the playgoer.

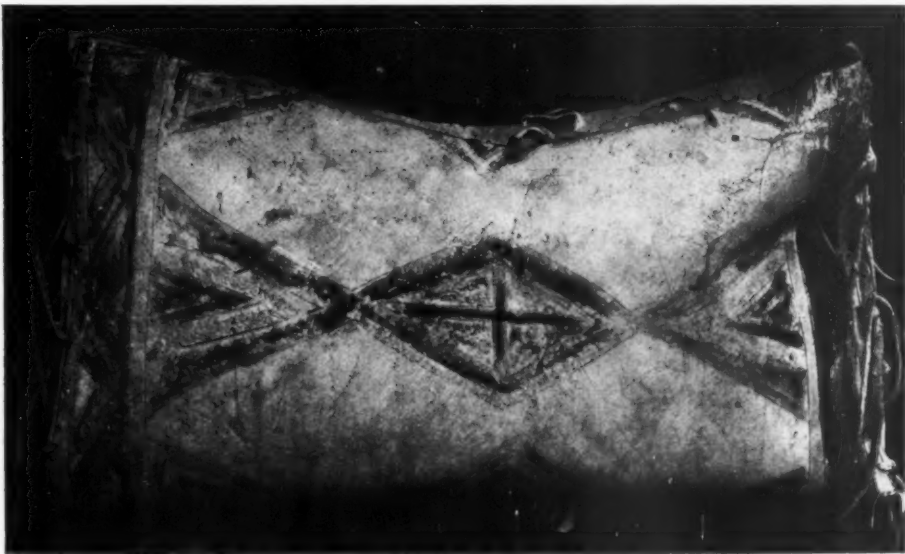
THE CROW INDIAN SUN DANCE

By Robert H. Lowie

WHILE I was investigating various phases of the old Crow culture in 1910, I heard a good deal about the sacred dolls formerly used in the Sun Dance, but without any expectation of ever seeing one "in the flesh" since the last ceremony of this type had been celebrated thirty-five years previously. After a while I learned however, that not only a doll, but what my informants regarded as the most sacred of all dolls, was still in the possession of an elderly widow, named "Pretty-enemy," whose husband had been the real owner. Pretty-enemy, being a woman, was not even permitted to unwrap her precious possession, which was occasionally taken out by old men visitors, who would address it in prayer and restore it to its envelope. The sense of unremunerative ownership evidently weighed on the woman's mind,

and when she heard that I had bought numerous articles of ethnographical interest she approached me through my interpreter with an offer to sell the doll. The price first demanded was so extravagant that I felt obliged to decline with regret, but after a lapse of negotiations Pretty-enemy again approached me with a more reasonable offer. Then the purchase was consummated after I had pledged strict secrecy so far as the Reservation people were concerned, for the woman was very much afraid of social ostracism as soon as her action should become known.

Looking at the doll with a layman's eye, one would hardly be disposed to set much store by it. It is a stuffed effigy of the human form, about six inches long, with crudely marked eyes and mouth, and a number of half-faded rectangular crosses front and back, to symbolize the



One of the most highly venerated of the medicine bundles of the Crow Indians. It consists of a rawhide envelope in which was kept the sacred doll together with various smaller sacred objects used in the ceremony of the Sun Dance.



morningstar; the head is topped with a profusion of plumes. The rawhide envelope in which the doll was kept also contained a number of subsidiary articles, including skunkskin regalia worn by the pledger of the Sun Dance, rawhide effigies, beaded bags and bunches of feathers — none of them of ostensibly great intrinsic value. Why then was this medicine bundle so highly regarded by the natives? In order to understand this, we must understand the character of the Crow Sun Dance.

By the several Plains tribes the Sun Dance was celebrated for a variety of reasons. Among the Western Algonkin, for example, it was performed mainly in order to ward off disease or other danger from the pledger and his family. But among the Crow the motive was quite different from that of their neighbors: a Crow promised to undergo the expense and hardship of the ceremony only when some near relative of his had been slain by the enemy and for the sole purpose of wreaking vengeance on the guilty tribe. Any military operation whatsoever was supposed to be the result of a supernatural revelation that ensured success, and accordingly such a revelation was sought in the Sun Dance, but in this case the end could be secured only through the hypnotic action of a particular type of object, the sacred doll. By fixedly gazing at the doll during the dance, a man could make himself go "out of his head," that is, go into a trance. When in this condition he would see an enemy lying bleeding on the ground, and this vision was taken as a promise by the supernatural powers that his quest for revenge would be crowned with success. Hence the mourner who undertook a Sun Dance was obliged to seek out some man

This sacred doll (about six inches long) was thought to give a vision at the close of an elaborate ceremony called the "Sun Dance," which lasted several days and in which all members of the tribe took part. The last Crow Sun Dance was celebrated some thirty-five years ago

owning one of the dolls and induce him to supply the needed effigy, and act as master of ceremonies, vested with dictatorial powers. The doll bought of *Pretty-enemy* had been successful, above all others of its kind, in effecting visions that led to victorious reprisals against the enemy, hence the high veneration in which it was held by the tribe.

It would seem from the above that the entire Sun Dance pivoted about the doll and the vision it procured. In a certain sense this is true, for no sooner had the vision been experienced and announced than the ceremony came to an abrupt stop, and preparations were made to bring about the fulfillment of the promise embodied in the revelation. Nevertheless this would be a very one-sided point of view. For the Crow Sun Dance, like the corresponding ceremony of all other Plains tribes, was a very elaborate performance, lasting several days, in which practically all the members of the tribe played a part. To the pledger and the doll-owner, to be sure, the essential thing was the vision to be obtained through the doll, but to the other tribesmen, whether actors or spectators, the performance meant something quite different. As in all great assemblies of the Crow tribe, there was abundant opportunity for the recital of one's heroic exploits; accordingly, to the great warriors the Sun Dance was a chance for self-aggrandizement before a large audience. Again, certain offices in the construction of the lodge devolved only on men and women of a perfectly pure mode of life, hence for these the ceremony meant a public recognition of virtue. Then there were others who voluntarily underwent self-torture, not to enhance the vision of the pledger, but

in order to secure one for their own benefit. As for the common herd, what appealed to them most was probably the dramatic aspect of the spectacle and the licensed frivolity that was customary throughout the duration of the ceremony.

The great interest of the Crow Sun Dance lies precisely in this: that it brings out so clearly the great difference between theory and reality, which coincides in this case with that between the esoteric and the exoteric aspects of the ceremony. Theoretically, any part of the performance not directly contributing to the production of the vision would seem superfluous. But in reality, to the great majority of the people, the "superfluous" portions of the performance are probably the main object of interest, filling the want of a free show. Moreover, these exoteric parts are the very ones that are most widely diffused over the Plains area and are thus presumably of great antiquity. To say therefore, that the entire Sun Dance of the Crow is nothing but the quest of a vision to ensure vengeance, would be wide of the truth. It seems so only to the logic-chopping white observer, or to the native himself when he begins to theorize about the complex things he does. But apart from the pledger, the Indian performers or witnesses pass through various psychological states during the ceremony, which are very remote from the notion embodied in the theory of the performance. This tendency to rationalize his actions, to interpret things to himself and mislead himself and the guileless ethnologist as to his real motives, is a very marked characteristic of primitive man that has invited and continues to engage the attention of ethnologists.



THE COMMON ROUND-WINGED KATYDID

Some recent ingenious and painstaking work in motion pictures has brought to our eyes the mysterious activities of insects in a way we should never have thought possible

The katydid "sings" by rubbing together the overlapping glassy parts of the wings just back of the head

EDUCATIONAL MOTION PICTURES IN NATURAL HISTORY

By Raymond L. Ditmars

THE growth of the educational motion picture rather parallels that of its dramatic ally. There was a time when a moving picture of a railroad train was considered a novelty and from that time the product for the theatres has grown steadily in elaboration until superb dramatic productions of five and six thousand foot lengths are in use in every civilized part of the world.

When I first considered the practicability of showing the habits of mammals, reptiles, amphibians and insects by means of motion pictures, I was confronted with the immediate decision that an especially constructed laboratory would be necessary and this would probably involve much originally designed apparatus. The latter point proved to be of prime importance. It was fully a year after the construction of the studio that continual experimental work demonstrated the best available apparatus. Experimentation had been difficult and so costly that I was called to a halt for five months in preparing "popular" educational films for theatrical use in order to cover expenses to purchase the necessary apparatus.

The studio was finally lighted with a combination battery of mercury vapor lamps and arc lights. It was necessarily arranged to do all the photographing by electric light owing to daytime duties at the Zoological Park. Switchboards, light housings and supports, all stagework, backgrounds and general accessories were built at the studio. A projecting room was arranged for the immediate testing of all films, an automobile provided with apparatus for collecting and a number of tanks and cages provided for specimens. Actual work in preparing a systematic series of natural history films was begun in August of 1913. With the reopening of the free lectures of the Board of Education of New York City in the fall of 1913, the first of these films was used for educational purposes.

The work of photographing mammals, reptiles and insects demands much varied ingenuity. Some of the mammals large enough to be dangerous took many liberties in the studio and at times did considerable damage. In order to avoid any trace of cagework in the pictures, the subjects had the free run of the

place and were enticed upon the stages with food or by rock shelters built for them. The promptings of a hungry stomach were found to be the most effective in the stage management of this theatre of nature and many of the pictures were made at the period of feeding time. The prowling of a hungry ocelot or tiger cat is a good illustration of animal management. For several days this creature's food had been concealed in different locations of the stage—sometimes hidden among the rocks or concealed in the branch of a tree. The picture was taken as the cat started to search for the food, crouching, scenting and alertly peering about, in characteristic actions of the wilds.

With the scenes of poisonous snakes striking, where there was the necessity of taking the photographs very close to the reptiles, the camera was run by an electric motor. This relieved the human operator of the grave danger of standing within a few feet of an infuriated fer-de-lance or cobra. In photographing the ring-necked cobra or *Spugh-schlange* of South Africa, the camera was peppered with drops of poison, as this snake voluntarily sprays its venom a distance of six to eight feet, its object being to blind the enemy. The snake was induced to face the camera by projecting a spot of light on a white semaphore directly under the lens.

The development of the eggs of frogs and toads was obtained with a camera set before a Bohemian glass jar and from the same position recording a few feet of film each day. One of these cameras did such duty for a period of two months, thus placing this instrument *hors-de-combat* for all other laboratory work. The life history of several spiders was obtained in like fashion. The story of a large species of *Lycosa*, or wolf spider, was recorded throughout upon the same "field"—a gravelly hollow six inches square. After each photograph the enclosure was covered with a bell-glass and wet sponge to provide the proper moisture—for many spiders are particularly delicate as captives.

The care of this spider was more laborious than that of a large animal. Soft-bodied grubs were hunted for her and she received drinking water by permitting miniature drops

to run to the end of a broom straw. These precautions were necessary in preserving the absolute cleanliness of her tiny yard, which on the projecting screen would be magnified thousands of areas. The spinning of her egg cocoon was successfully accomplished and we awaited with much anxiety the time when the young spiders would emerge and crawl upon the parent's back — hundreds of them, presenting an indescribable spectacle. At last this chapter of the family history was recorded and there was a wait of eight days for the infants to swarm from the mother's back and shift for themselves. This process may be spectacularly inaugurated by a sudden vibration of the ground, causing the parent to jump — then a riot of the spiderlings swarms over the ground.

An additional camera was trained into the field, for once the dispersal takes place all is over and the little spiders are gone. The critical time, when the youngsters appeared uneasy, arrived on a humid evening, when a heavy electrical storm was brewing. The rectifiers for the mercury vapor lamps were already giving some trouble as the cameras were adjusted. With the cameras running, we dropped a steel ball upon the metal stand containing the spider arena to cause it to vibrate, and the spider family departed to all points of the compass. This was an event we had anxiously awaited and luck appeared to be with the photographer. As the electrician prepared to throw out the main switch and extinguish the illuminating batteries, lightning followed the feed wires into the studio and gave us a week's work repairing burned-out parts. But the history of the spider family was completed minus a few feet of film showing the exit of the more laggard members.

So many insects are tiny, almost microscopic creatures and such a large proportion of them perform their characteristic capers in inaccessible places that the value of greatly enlarged motion picture portrayals opens previously impossible opportunities for study and observation in the schoolroom. By these methods students are enabled to see habits that the greater number of them would never in any other way observe. Not one child in a million has seen the katydid sing, the praying mantis rear in frightful pose, grasp and devour a fly, a gaudy grass-

hopper carefully brush pollen dust from its face.

It is not so difficult to obtain motion pictures of insects eating because these creatures are always hungry and persist in satisfying their appetites even under greatly disturbed conditions, but to obtain scenes of nervous spiders caring for their young and to show insects singing — that is a different matter.

To photograph the katydid singing was a difficult task. This insect sings by scraping the wings together and only at night. A light of any kind will stop it. Yet to photograph a singing specimen at night meant that a stream of powerful electric light must be turned upon the songster. The deed was done in a grove of young oaks close to the studio. Several dozen katydids were placed in the trees and the camera — on a high tripod — focused on the vegetation of a tree in the center of the grove. The instrument, with special long focus lens was to record the movement of a single insect that watched all proceedings, but remained silent owing to our close arrangements with the machines. The camera was then belted to a small motor so that no operator would stand by the instrument to disturb the insect. A searchlight, such as is used in the navy was then trained on the single tree in which reposed the actor, its powerful rays making photography possible. With the remainder of the grove in darkness the decoy katydids sang vigorously. In the intense beam of violet light the principal in this educational drama was seen turning slowly. Was it irritated by the light, and would it crawl from the lines of focus? This would mean much labor in moving the heavy apparatus in what seemed a fruitless and costly experiment. But its uneasiness was caused by the saucy taunts of the decoys. Its wings were elevated slightly. It could not resist answering some of those rasping calls. The man behind the searchlight could be seen glistening with perspiration as he "fed" the carbons of the great arc light. The writer's fingers were upon the switch of the camera motor. Then the insect's wings began to move rhythmically and another chant was added to the chorus of "katydid, katydid n't," and so it continued until the picture was taken. And this picture has been seen by thousands of school children who never knew how insects "sing."

MUSEUM NOTES

SINCE the last issue of the JOURNAL the following persons have become members of the Museum:

Life Members, MAJOR BASIL HICKS DUTCHER, U. S. A., and MR. WILLIAM RUTGER BRITTON;

Annual Members, MRS. W. P. HARDENBERGH, MRS. CHARLES HIRSCHHORN, MRS. W. W. HOPPIN, JR., MRS. ALBERT L. JUDSON, MRS. S. R. KAUFMAN, MRS. JACOB LANGELOTH, MRS. JOHN R. LIVERMORE, MRS. MORRIS LOEB, MRS. THERESA MAYER, MRS. GEORGE L. OTIS, MRS. EUGENE H. PADDOCK, MRS. JEROME REGENSBURG, MISS MARIE LOUISE BALDWIN, MISS MARY PINCHOT ENO, MISS EMMA G. SEBRING, MISS MARY SHOONMAKER, HON. HENRY ROBERTS, DR. CHARLES E. FLECK, DR. T. MITCHELL PRUDDEN, and MESSRS. H. H. BENEDICT, ALFRED POLK BERGH, ALFRED BLEYER, A. I. ESBERG, B. HAMBURGER, MARTIN F. JACKSON, ROBERT U. JOHNSON, GEORGE KENNAN, WARREN KINNEY, HENRY M. LESTER, EDMUND J. LEVINE, CHARLES N. MEAD, GEORGE W. MERRIHEW, ALLAN PINKERTON, MYRON T. SCUDDER.

A NEW expedition, to cross South America by way of La Paz and Cochabamba, the Mamore, Madeira and Amazon rivers, and to be known as the "Collins-Day South American Expedition," has been organized to sail December 26 for several months' work in exploration and zoölogical collecting. Mr. George K. Cherrie will accompany the expedition as the naturalist representing the American Museum of New York and Mr. Robert H. Becker will represent the Field Museum of Chicago. The birds and the mammals collected by the expedition will be presented to the American and Field museums respectively for permanent ownership of types and for scientific study and publication, preliminary to a later equal division of all specimens except types between the two institutions.

COLONEL THEODORE ROOSEVELT on the evening of December 10 presented before the members of the Museum some of the zoölogical results of his recent expedition to South America. He was introduced by Professor Henry Fairfield Osborn and was accompanied on the platform by Mr. George

K. Cherrie, one of the Museum's representatives with him on the expedition. A full report of the expedition will be given in the February JOURNAL.

DR. FELIX VON LUSCHAN, professor of anthropology at the University of Berlin and director of the Royal Ethnographical Museum, visited the Museum several times during the month of December. Professor von Luschan, who delivered the Huxley lectures some years ago, had been one of the guests of honor at the Australian meeting of the British Association for the Advancement of Science. He is primarily a specialist in physical anthropology, but has done notable work in ethnography, being especially interested in the Oceanic and African fields, and has also conducted archaeological researches in Asia Minor. He found many specimens of great interest in the South Sea hall and pronounced the Jesup collection of tattooed Maori skulls to be unique. On December 17 Professor von Luschan lectured at the American Museum under the auspices of the American Ethnological Society; his subject was "Culture and Degeneration." He dwelt particularly upon inherited physical disabilities and the alarming decrease in the birth rate among the wealthier classes in the cities of Europe.

A MEMORIAL MEETING in honor of the late Professor Albert S. Bickmore will be held at some time during the latter half of January. Mr. Joseph H. Choate, and Mr. Cleveland H. Dodge, who were intimately associated with Professor Bickmore, will give brief addresses in which they will recount the steps that led to the founding of the museum and the story of the early days of the institution. Mr. L. P. Gratacap, curator of mineralogy of the Museum faculty, will present personal reminiscences of Professor Bickmore.

THE following note from *Science* for December 18 is of interest to JOURNAL readers: At the Academy of Natural Sciences of Philadelphia on Tuesday evening, November 24, Dr. Henry Fairfield Osborn was presented with a Hayden medal. In presenting the medal Dr. Samuel G. Dixon called attention to the fact that Mrs. Emma W. Hayden, widow of the well-known scien-

tific man, Ferdinand Venderveer Hayden, had established a deed of trust arranging for a sum of money and a bronze medal to be given annually to the author of the best publication, exploration, discovery or research in geology or paleontology, or a similar subject. Professor James Hall, of Albany, received the award in the first instance and the other nine succeeding him were Edward D. Cope, 1891; Edward Suess, 1892; Thomas H. Huxley, 1893; Gabriel August Daubree, 1894; Carl H. von Littel, 1895; Giovanni Capellini, 1896; Alexander Petrovitz Karpinski, 1897; Otto Torell, 1898; Giles Joseph Gustav Dewalze, 1899. In 1900 the deed of trust was modified so as to award a gold medal every three years. The first to receive the new medal was Sir Archibald Geikie; the second was Dr. Charles D. Walcott in 1908 and the third John Casper Branner in 1911.

THE Annual Meeting of the Board of Trustees of the American Museum of Natural History will occur on the evening of February first, when the members of the Board will be guests of President Osborn at dinner at his residence, 850 Madison Avenue.

THE December meeting of the Section of Biology of the New York Academy of Sciences was devoted to a "Symposium on Porto Rico" in which the progress of the Academy's natural history survey of that island was described.

Professor Charles P. Berkey outlined his geological reconnaissance of the island, in which he and Dr. Fenner had traveled more than two thousand miles. They had studied the rocks at so many points that they were enabled to construct a preliminary geological map which revealed the general geological history of the island.

Professor N. L. Britton outlined the progress of the botanical investigation of the island. The material collected by the Academy workers has been distributed to a number of specialists and from their labors, knowledge of the flora is rapidly being extended.

Dr. Marshal A. Howe by means of the stereopticon illustrated a series of marine algae which he collected recently. Especially interesting were the reef-building coralline algae. Dr. N. Wille summarized the present knowledge of the fresh-water algae, in which much further collecting is

necessary. Mr. Roy W. Miner described his collecting of marine invertebrates. Mr. Frank E. Lutz in summarizing the present knowledge of the insects and spiders touched upon several interesting problems of distribution in which Porto Rico offers an attractive field for further work. Mr. J. T. Nichols described the fish fauna of the island.

THE manuscript for a book, "Men of the Old Stone Age," which covers the long Palaeolithic history of Europe, was completed by Professor Henry Fairfield Osborn during the month of November and it will appear from the Scribner press in February. The writing of this work was suggested by the author's tour through the caverns of Italy, France and Spain, described in the December, 1912, number of the JOURNAL. The work differs from the volumes recently published by Professor Sollas, Lord Avebury and Professor James Geikie in presenting a fuller description of the various primitive races of men and in giving a connected story of the geology, geography, climate, and development of the flint industry and art. An attempt has been made to give a very clear and semipopular treatment of our present knowledge of the long prehistory of Europe, closing with the advent of the men of the New Stone Age, which is believed to have occurred between 7000 and 9000 years ago.

MR. N. C. NELSON has returned from several months' archæological field work in New Mexico. His work this year was a continuation of that of previous years on the ancient villages of the Tanos, south of Santa Fé. He made partial excavations of three large ruins, digging out altogether about four hundred and fifty ruins from which he brought back approximately seven hundred specimens for the Museum. A large number of skeletons were also secured, some from the ruins and some from refuse heaps belonging to the different villages. In his excavations Mr. Nelson discovered a stratified deposit in which four distinct types of pottery were found. Since the pueblos clustered all about the region belong to one or more of these pottery-making stages, the chronological position of most of the ruins can now be determined on the basis of this discovery.

SIR DOUGLAS MAWSON will lecture on "Racing with Death in Antarctic Blizzards," under the auspices of the American Geo-

graphical Society and the American Museum of Natural History at Aeolian Hall, January 17, 1915. The lecture will cover Dr. Mawson's experiences in the Antarctic from 1911 to 1914 and will be illustrated with still and motion pictures which are pronounced by Sir Ernest Shackleton, Mr. A. Radclyffe Dugmore and others who have seen them, to be the most marvelous pictures ever presented on polar subjects. Professor Henry Fairfield Osborn will preside and Dr. Mawson will be introduced by Mr. John Greenough, chairman of the Council of the American Geographical Society. Dr. Mawson has recently been knighted by George V in recognition of his scientific research in the Antarctic. He was well equipped for valuable work, having been lecturer in chemistry at Sydney University and in geology at Adelaide University even before he obtained his doctorate in science in 1909. Later he was on the staff of Sir Ernest Shackleton's expedition as physicist and mineralogist and was one of the party which reached the summit of Mount Erebus and also the South Magnetic Pole. In 1911 he organized the Australasian Antarctic expedition and led it into the great unknown region south of Australia. It is of the story of the accomplishment and the privations and tragedies of this expedition that Dr. Mawson will speak in New York.

THE anthropological course of lectures for 1915 is to be devoted to the Aboriginal Art of North American Indians. The subject has been chosen in recognition of the increasing demands of students of art and design upon the ethnological collections in the Museum. The opening and closing lectures are to be given by Dr. Clark Wissler; the first will deal with "Technique and Distribution of Textile Designs," and the concluding lecture with "Design Names and Symbolism." Dr. Herbert J. Spinden, who has devoted much time to the study of the art of the Southwest and Central America, will discuss in the second and third lectures of the series, "Form and Ornament in Ceramic Art" and "History and the Higher Arts." These lectures will be given in the West Assembly hall of the Museum on Thursday evenings in January at 8:15 o'clock.

THE Indian figures for the Hopi group under construction by Mr. Howard McCormick in an alcove off the hall of the Southwest Indians, have been modeled by

Mr. Mahonri Young and are at present in process of casting in the Museum's preparation shop. It is understood that Mr. Young has in charge also the pediments for the Utah State Capitol at Salt Lake City and that he has a group of bronzes ready for exhibition at the San Francisco Exposition.

THROUGH the kindness of Miss M. Eliza Audubon the Museum has recently come into possession of a painting by John James Audubon. This painting has been in the Museum on deposit for some time and its gift makes a very important addition to the Museum's collection of Auduboniana. It is one of the largest of Audubon's pictures and is especially pleasing in composition and color.

THERE has recently been placed on exhibition in the Plains Indian hall a small model of a Hidatsa earth-lodge constructed by Mr. S. Ichikawa after drawings made by Mr. F. N. Wilson and plates from the early publication, *Travels in the Interior of North America* by Maximilian, Prince of Wied, who visited the Hidatsa and Mandan in 1832-1834. It was in a village of houses of this type that Lewis and Clark spent their first winter (1804).

THE Museum has long been desirous of obtaining a specimen of the devilfish (*Manta birostris*), the largest of all rays. This species, owing to its great size, the difficulty of caring for specimens in the field and the danger attending its capture, is very poorly represented in museums. In fact no full-grown specimen, so far as known, is on exhibition anywhere. Last summer the Museum sent an expedition to the west coast of Florida for the purpose of capturing a devilfish. The expedition succeeded in getting two specimens. For the capture of these we are indebted to Mr. Russell J. Coles of Danville, Virginia, an amateur ichthyologist who has had considerable experience in the capture of large sharks. Mr. Coles was in charge of the capturing of the specimens and did most of the work of harpooning them. The expedition made its headquarters at Captive Island, about twenty-five miles south of Punta Gorda. The two devilfish caught were splendid specimens, the larger one eleven feet wide and the smaller one seven feet ten inches. Excellent casts of both specimens were made in the field by Mr. J. C. Bell, of the Museum's department

of preparation. The scientific work of the expedition was in the hands of Dr. L. Hussakof, who obtained, in addition to the studies necessary for the correct mounting and coloring of the specimens for exhibition, valuable data on the structure and natural history of this little-known ray.

Two new leaflets by Dr. F. E. Lutz, assistant curator of invertebrate zoology, have recently been issued in the Museum's educational series. The first deals with the thirty-four species of butterflies most common in the vicinity of New York City, each species being illustrated by a life-size figure. The second gives directions for collecting and preserving insects in the field.

THE Peruvian and Mexican collections of the Metropolitan Museum of Art have been deposited with the American Museum for an indefinite time and may be used either for study or exhibition purposes.

THREE new exhibits of the department of anatomy and physiology in the synoptic hall on the third floor include a series of mounted limb-bones, showing the adaptation of mammalian limbs to their various modes of living, and two series of wax models illustrating respectively the evolution of the vertebrate chondrocranium and the brain.

MR. ERNEST THOMPSON SETON on the evening of November 27 gave a special lecture in the auditorium of the Museum on "Voices of the Night," in which he told the story of some of the wild animals of North America and gave imitations of their calls.

A NEW edition of the *General Guide* to the exhibition halls of the museum has just been issued comprising 125 pages and 65 illustrations. Experience has shown that the changes in the Museum's collections are so extensive that a guide must be issued at least once a year in order to keep pace with them.

IMPORTANT exhibits in the department of vertebrate palæontology have recently been opened to the public. The first of these is a skeleton of *Scelidotherium*, which is a part of the Cope Pampean collection secured through the generosity of the late Morris K. Jesup, former president of the Museum. This animal belongs to the sloth family and is interesting anatomically in its approach to the anteaters. Two nearly perfect skulls of

horned dinosaurs have been added to the reptile collection. These are a part of the collection made by the Museum expedition to the Red Deer River, Alberta, in 1913. The skeleton of the giant carnivorous dinosaur, *Tyrannosaurus*, is being mounted in the Pleistocene hall, and the new duck-billed dinosaur, *Corythosaurus*, in the dinosaur hall.

ADDITIONS to the mineral collection comprise an exchange with Professor W. Vernadsky of the Imperial Academy of Sciences and a series of purchases made from the interest of the Bruce endowment. The former were interesting from locality, and among them powellite from the Urals merits mention. Noticeable among the purchases are native bismuth and the association of bismuth and molybdenite from North Queensland, Australia; a remarkable native copper coated with solid malachite like a paint, from Michigan; small delicate crystallizations of gold from Verespatak, Hungary; deep blue halite from Stassfurt, Germany; quartz (nodular) with inclusions of acicular bismuth from New South Wales; a handsome large crystallization of diopside from South Africa; and the new mineral wilkeite from Riverside County, California. Some superior specimens of species already represented were purchased, among which particular reference may be made to catapleiite, cryolithionite, eudialyte, narsarsukite, schizolite, steenstrupine and willemite from Greenland.

THE department of public health is at present engaged in the preparation of a special exhibit of military hygiene and sanitation, dealing with the health of armies, the hygiene of the individual soldier and the general problems of camp sanitation.

A number of new exhibits illustrative of insect-borne diseases were added to the department's display during 1914, the most important single exhibit being a model of the flea (carrier of bubonic plague) 1,728,000 times natural size, prepared by Mr. Ignaz Matusch. The history of the bubonic plague in the past is shown by reproductions of a number of early paintings and by a series of maps illustrating the geographic spread of disease during its historic epidemics. A series of photographs of four American army surgeons who have discovered a mosquito transmission of yellow fever, has been hung near the entrance of the hall.

The American Museum of Natural History

Seventy-seventh Street and Central Park West, New York City

Open free to the public on every day in the year.

The American Museum of Natural History was established in 1869 to promote the Natural Sciences and to diffuse a general knowledge of them among the people. It is dependent upon private subscriptions and the fees from members for procuring needed additions to the collections and for carrying on explorations in America and other parts of the world. The membership fees are,

Annual Members.....	\$ 10	Patrons.....	\$1,000
Sustaining Members (annually).....	25	Associate Benefactors.....	10,000
Life Members.....	100	Associate Founders.....	25,000
Fellows.....	500	Benefactors.....	50,000

Guides for Study of Exhibits are provided on request to members and teachers by the department of public education. Teachers wishing to bring classes should write or telephone the department for an appointment, specifying the collection to be studied. Lectures to classes may also be arranged for. In all cases the best results are obtained with small groups of children.

The Museum Library contains more than 60,000 volumes with a good working collection of publications issued by scientific institutions and societies in this country and abroad. The library is open to the public for reference daily — Sundays and holidays excepted — from 9 A. M. to 5 P. M.

The Technical Publications of the Museum comprise the *Memoirs*, *Bulletin* and *Anthropological Papers*, the *Memoirs* and *Bulletin* edited by J. A. Allen, the *Anthropological Papers* by Clark Wissler. These publications cover the field and laboratory researches of the institution.

The Popular Publications of the Museum comprise the *JOURNAL*, edited by Mary Cynthia Dickerson, the *Handbooks*, *Leaflets* and *General Guide*. The following list gives some of the popular publications; complete lists, of both technical and popular publications, may be obtained from the Librarian.

POPULAR PUBLICATIONS

HANDBOOKS

- NORTH AMERICAN INDIANS OF THE PLAINS.** By Clark Wissler, Ph.D. Paper, 25 cents; cloth, 50 cents.
- INDIANS OF THE SOUTHWEST.** By Pliny Earle Goddard, Ph.D. Paper, 25 cents; cloth, 50 cents.
- ANIMALS OF THE PAST.** By Frederic A. Lucas, Sc.D. Paper, 35 cents.

ILLUSTRATED GUIDE LEAFLETS

- GENERAL GUIDE TO THE COLLECTIONS.** New edition issued December, 1914. Price, 25 cents.
- THE COLLECTION OF MINERALS.** By Louis P. Gratacap, A.M. Price, 5 cents.
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